

HCF and LCM – Extension work

Name: _____ ()

Class: _____

STUDY

YOUR TURN

1. Find the H.C.F. of the numbers use the alternative (continuous division) method.

a. 12 and 36

b. 30, 48 and 72

Example 18

Find the H.C.F. of 24, 32 and 36.

Solution

By prime factorisation,

$$24 = 2 \times 2 \times 2 \times 3$$

$$32 = 2 \times 2 \times 2 \times 2 \times 2$$

$$36 = 2 \times 2 \times 3 \times 3$$

$$\therefore \text{H.C.F. of 24, 32 and 36} = 2 \times 2 = 4$$

Alternative method:

$$\begin{array}{l} 2 \overline{) 24, 32, 36} \leftarrow \text{Divide by common prime factor 2} \\ 2 \overline{) 12, 16, 18} \leftarrow \text{Continue to divide by common prime factor 2} \\ \underline{6, 8, 9} \leftarrow \text{Stop dividing as 6, 8 and 9 have no common prime factor} \end{array}$$

$$\therefore \text{H.C.F. of 24, 32 and 36} = 2 \times 2 = 4$$

STUDY

YOUR TURN

2. Find the L.C.M. of the numbers use 2 different methods.

a) 12, 18 and 24

Example 20

Find the L.C.M. of

(a) 12 and 18,

(b) 15 and 20.

Solution

(a) By prime factorisation,

$$12 = 2 \times 2 \times 3 = 2^2 \times 3$$

$$18 = 2 \times 3 \times 3 = 2 \times 3^2$$

$$\begin{aligned} \therefore \text{L.C.M. of 12 and 18} &= 2^2 \times 3^2 \\ &= 4 \times 9 \\ &= 36 \end{aligned}$$

Alternative method:

$$\begin{array}{l} 2 \overline{) 12, 18} \leftarrow \text{Divide by the smallest prime factor, 2} \\ 2 \overline{) 6, 9} \leftarrow \text{Continue to divide 6 by 2} \\ 3 \overline{) 3, 9} \leftarrow \text{Carry 9 to the next row as it is not divisible by 2} \\ 3 \overline{) 1, 3} \leftarrow \text{Divide by the next smallest prime factor, 3} \\ \underline{1, 1} \leftarrow \text{Only 1s remain in the last row} \end{array}$$

$$\begin{aligned} \therefore \text{L.C.M. of 12 and 18} &= 2 \times 2 \times 3 \times 3 \\ &= 2^2 \times 3^2 \\ &= 36 \end{aligned}$$

To find the L.C.M. using the prime factorisation method, group the prime factors of 12 and 18 into sets as follows:

$$\begin{array}{l} 12 = 2^2 \times 3 \\ 18 = 2 \times 3^2 \\ \text{L.C.M.} = 2^2 \times 3^2 \end{array}$$

Choose the greatest possible from each set.

CHALLENGE

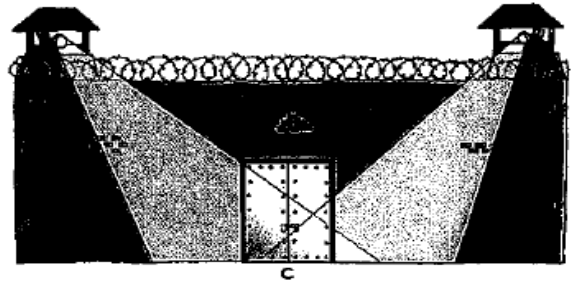
1. Find the H.C.F. and the L.C.M. of each of the following sets of numbers (Use 2 different methods)

a. 21 and 33

b. 16, 24 and 32

2. Find the H.C.F. and the L.C.M. of $2^2 \times 3^3$ and $2^3 \times 3^2 \times 5$

3.



A prison has two towers with rotating floodlights. Floodlight A takes 30 seconds to complete a revolution while Floodlight B takes 25 seconds. At a certain instance, both floodlights shine at a spot C. When will both the floodlights shine again simultaneously on spot C?

4.

Amy has 3 types of ribbons of lengths, 84 cm, 140 cm and 308 cm. She wishes to cut the ribbons into pieces of the same length for making butterfly knots.

- (a) What is the greatest possible length that she can cut for each piece, if no ribbon is to be left unused?
- (b) How many pieces of butterfly knots of equal lengths will she get?